

INSUFFICIENCIES OF THE 20-TH CENTURY THEORIES AND THEIR NEGATIVE ENVIRONMENTAL IMPLICATIONS

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Abstract

Following a courageous denunciation by Barton Richter in *Physics Today*, November 2006, of contemporary particle physics as being "theological speculations," we present insufficiencies of special relativity, quantum mechanics, superconductivity, chemistry, standard model, gravitation and astrophysics for conditions beyond those of their original conception.

FOREWORD

The author would like to express his sincere appreciation to Burton Richter for his courageous denunciation, in *Physics Today* of November 2006, of the current condition of particle physics as being essentially that of "theological speculations."

At the same time the author would like to lament that Richter did not enter with sufficient technical depth into the ultimate origin of the ongoing crisis in particle physics because, in so doing, he becomes part of the problem.

As well known, our planet is afflicted by increasingly cataclysmic climactic changes whose solution requires new clean energies and fuels. But all industrially meaningful new energies and fuels based on conventional disciplines had been discovered by the middle of the 20-th century.

Hence, the solution of said environmental problems crucially depends on the identification of the conditions of unequivocal applicability of the doctrines of the 20-th century, as well as the broader conditions under which they are at best approximately valid, thus permitting the search of broader vistas for much needed basic advances.

INSUFFICIENCIES OF SPECIAL RELATIVITY

The author has often indicated in his papers that Special Relativity (SR) has a majestic mathematical structure as well as historical verifications for the conditions originally conceived by Einstein and limpidly identified in his writing, namely, for point-like particles and electromagnetic waves propagating in vacuum, thus including relativistic treatments of the hydrogen atom, particle accelerators, and similar systems.

Admittedly, doubts on the final character of SR within the arena of its original conception have been voiced for about one century, and have lately increased particularly in view of what is becoming the ultimate scientific frontier of basic research, the conception of space as a universal medium.

Nevertheless, SR works well for systems verifying its original conditions, such as for particle accelerators. Also, these conditions have no known relevance for the solution of current environmental problems. Consequently, we believe that the first reason for the ongoing "theological speculations"

is the widespread lack of attention on the limitations of SR for physical conditions beyond these of its original conception and experimental verification, as outlined below.

ANTIMATTER: SR (as well as General Relativity, see below) provides no meaningful classical representation of antimatter, in which field it should be considered "inapplicable," rather than "violated," because antimatter had yet to be discovered at the time of conception of the theory.

This limitation is established by the absence of any classical distinctions between neutral systems of matter and antimatter (that are particularly important for stars). Even for the case of charged particles it is easy to see the inconsistency of the classical treatment (essentially done via the sole change of the sign of the charge) because, e.g., the operator image of such a representation is given by a "particle" with the wrong sign of the charge, rather than a charge conjugated antiparticle.

Even though considered innocuous by a number of colleagues, in reality the above limitation carries deep implications for numerous segments of contemporary physics including "theological" (rather than scientific) studies on cancer treatments via antiparticles, the gravity of elementary antiparticles in the field of matter, not to mention catastrophic inconsistencies in grand unified theories without due attention to the inclusion of antimatter.

NONLOCALITY: For the evident purpose of enlarging the arena of applicability of SR, the physical universe was generally believed during the 20-th century to be reducible to point-like particles that, having no dimension, would always move in vacuum.

However, by the second part of the 20-th century it became already clear that such a view is a mere approximation due to the fact that particles are generally extended and, even when having point charges (such as the electron) they have indeed a extended wavepackets causing nonlocal interaction of integral type (because extended over the volume of mutual penetration) that, as such, cannot be reduced to a finite number of points, as needed for SR to apply.

Nonlocal interactions of the above type are dramatically beyond any possibility of scientific representation by SR for numerous reasons, such as: the basic topologic of SR is inapplicable being local-differential, thus implying the loss of Lie's theory with consequential loss of the Lorentz and Poincare' symmetries; contact interactions are not derivable from a Lagrangian or a Hamiltonian, while being of "zero range" or of instantaneous character; the nonlocal interactions here considered are generally nonlinear in the wavefunctions; and other reasons.

For "theological" purposes, the nonlocal-integral interactions caused by deep wave overlapping are generally dismissed as having no valid physical effects. However, in the last part of the 20-th century these interactions came to full light in chemistry because, after one century of failed efforts, it became impossible to achieve an exact representation of molecular binding energies (due to the historical missing of 2 %).

In turn, this limitation forced departures from quantum axioms via the introduction of the so-called "screened Coulomb potentials" (see below for the loss of the very quantum of energy under these adulteration of fundamental axioms). By contrast, recent studies have shows that an exact representation of molecular characteristics emerges when valence electrons are represented as they are in realty, point-like charges with extended wavepackets in conditions of deep mutual penetration, thus experiencing not only potential interactions of Coulomb type, but also contact nonlocal, nonlinear and non-Hamiltonian interactions.

The implications for particle physics of the above historical occurrence in chemistry begin to illustrate rather dramatically the "theological" nature of most contemporary particle research. If nonlocal, nonlinear and non-Hamiltonian interactions have such implications in the deep wave over-

lappings of valence electrons, they are expected to have essentially similar numerical implications for deep inelastic scattering of particles.

But the totality of contemporary particle experiments in inelastic scatterings are conducted via the century old "potential scattering theory" that simply cannot represent nonlocal-integral efforts expected to be inevitable for deep inelastic scatterings.

Hence, it is indeed possible to state without hesitation that most of contemporary "experimental results" elaborated via the conventional scattering theory can be at best qualified as being "experimental beliefs" and they will remain so until a covering scattering theory is worked out.

IRREVERSIBILITY: Always for the studious intent of extending the arena of applicability of SR beyond that of its original conception, it was generally believed during the 20-th century that irreversibility is a macroscopic phenomenon because, according to such a theology, when macroscopic objects are reduced to their elementary point-like constituents, irreversibility "disappears."

On serious scientific grounds, there are theorems (provable by graduate students in physics) establishing that a macroscopic irreversible event cannot be consistently reduced to a finite number of particles all in reversible conditions (and vice versa). Hence, irreversibility originates at the ultimate level of nature, that of elementary particles.

Since all known potentials are reversible, the only possible or otherwise scientific origin of irreversibility is provided precisely by the contact, nonlocal and nonpotential interactions considered above.

But the entire mathematical and physical structure of SR is reversible in time, as well known. Consequently, any belief of the exact characters of SR for irreversible processes, such as deep inelastic scatterings to mention only one, can only be claimed to be purely "theological," since the only credible scientific issue is the search for a suitable covering of SR that is as irreversible in mathematical and physical structure as the phenomena to be represented.

At this point, and only following the above technical analysis, we can identify the unreassuring implications for society of the theological condition of particle physics. On one side, society has a compelling need for new clean energies, as now denounced by various heads of states and scientists alike. On the other side, all energy releasing processes are irreversible, from fire discovered since the birth of human civilization to the most advanced nuclear energies.

Hence, the continued insistence in reducing the entire universe to abstractions compatible with SR is much more than a "theological" posture since it constitutes a real threat to society.

LIMITATIONS OF QUANTUM MECHANICS

It is generally believed that Quantum Mechanics (QM) is universally valid for all possible conditions existing in the universe. This belief too is more than purely "theological" because it requires the raising of serious issues of scientific ethics and accountability for the very survival of the human society.

There is no doubt that, for the conditions under which particles can be credibly abstracted to be point-like, QM is indeed exactly valid. This is the case for the hydrogen atom where QM achieved majestic results with the exact representation of all spectral lines from first unadulterated axioms or the construction of particle accelerators via relativistic QM that do indeed work, in which cases particles can be approximated as being point-like while moving in vacuum. Despite these historical results, QM has its own clear limitations, such as:

ATOMIC PHYSICS: In the transition from the hydrogen atom to the helium, there exist

clear deviations of the prediction of QM from experimental data; these deviations increase with the number of atomic electrons; and the deviations become embarrassing when passing to a QM description of heavy atoms such as the zirconium.

The only possible reason for the insufficiency is the presence in systems with many electrons of interactions beyond the representational capabilities of QM, which interactions can only be of nonpotential type, that is, not derivable from a Lagrangian or a Hamiltonian.

Perhaps more dramatic has been the failure by QM to achieve any quantitative representation of the spectral emission of the Sun in over one century of studies.

Under the above conditions, the belief of the universal validity of QM is not only "theological" but actually dangerous to society, since the only scientific issue is the search for a covering - broadening of QM capable of achieving a more credible representation of nature.

SUPERCONDUCTIVITY: The current status of superconductivity can be compared to the status of atomic physics prior to the quantum description of the atomic structure. In fact, QM has indeed permitted a first description of superconductivity, but via an ensemble of Cooper pairs considered as point-like without a quantitative description of their structure (because identical electrons are predicted by QM to repel each other, and are certainly not predicted to enter into their deep correlation - bond as need for Cooper pairs).

Anybody who believes that superconductivity can reach truly basic advances without a quantitative description of the structure of its main element, the Cooper pair (hence, without surpassing QM via a suitable covering theory), rather than doing "theological speculations," raises serious issues of scientific ethics and accountability.

CHEMISTRY: As stressed above, QM is exactly valid for the structure of "one" hydrogen atom. However, the same discipline is no longer exactly valid for the structure of "two" hydrogen atoms bonded into the hydrogen molecule because of the historical inability to represent a residual 2 % of the binding energy from unadulterated first principles.

Attempts to bypass this insufficiency have been conducted via the so-called "screening of the Coulomb law" and then the claim that quantum mechanics and chemistry are still valid. In reality, the quantum of energy is solely possible for the unadulterated Coulomb law and it is impossible for any of its various screenings, for which no quantized orbit can be defined, thus raising serious issues of scientific ethics and accountability for the very use of the name "quantum mechanics and chemistry" under the conditions considered.

The above insufficiency of QM should not be surprising because it can be predicted from its inability to reach an exact representation of the spectral emissions of the helium, since the hydrogen molecule and the helium both have two electrons.

Besides the above basic insufficiency, QM had prohibited a quantitative study of molecular bonds because nuclei do not participate in such bonds due to their large mutual distance, as a result of which molecular structures originate solely from valence bonds. But two electrons are predicted to repel each other according to QM. Hence, the various notions of valence are pure nomenclatures deprived of scientific, that is, quantitative content.

QM is also responsible for numerous additional insufficiencies or sheer inconsistencies in chemistry. One of them is the prediction that all substances are paramagnetic. This is a necessary consequence of the absence of an actual, attractive force between identical valence electrons in which case the electron orbitals of different atoms are independent. It then follows from quantum electrodynamics that the applicability of an external magnetic field causes the polarization of the

orbitals of all the atoms of any chemical species, resulting in the indicated prediction of universal paramagnetic character in dramatic disagreement with reality.

NUCLEAR PHYSICS.]: There is no doubt that QM has achieved historical results in nuclear physics or that nuclear power plants conceived and constructed via quantum laws do indeed work.

However, any belief that QM is exactly valid in nuclear physics is asocial because of an excessive number of unresolved basic insufficiencies.

As an example, following one century of efforts, QM failed to achieve an exact representation of the basic data of the lightest nucleus, the deuteron, since it still misses 1% of the magnetic moment following all possible relativistic corrections; QM has been unable to represent the spin 1 of the deuteron ground state (since quantum axioms predict that the ground state of two particles with spin 1/2 must be zero); there has been no credible explanation of the stability of the neutron when a constituent of the deuteron; etc.

In passing to heavier nuclei, the insufficiencies of QM can only be qualified as embarrassing thus demanding the construction of a covering theory more suitable to represent physical conditions existing in the nuclear structure, since they are dramatically different than the conditions of the original conception of the theory, the planetary structure of the atom.

Without entering into additional technical insufficiency, any belief that QM is exactly valid in nuclear physics can be easily disqualified as being asocial, let alone "theological," from the incontrovertible evidence that *nuclei do not have nuclei*, namely, nuclei do not have a Keplerian structure. Consequently, the basic symmetries of QM, the Galilean and Poincaré symmetries, cannot possibly be exact for nuclei since they notoriously apply solely to Keplerian or planetary structures.

The social implications of the "theological" belief of the exact character of QM in nuclear physics are rather serious. Recall that, as it is the case for SR, QM is also strictly reversible in time. Yet all energy releasing nuclear processes are irreversible. Consequently, the restriction of all research in nuclear energies to comply with QM, that has been rigidly imposed by academia and governments alike during the entire 20-th century, has perhaps done a damage to society of potentially historical proportion.

PARTICLE PHYSICS: There is no doubt that contemporary particle physics is a synonym for "quantum theology" with a rather severe price to pay by mankind for the increasingly cataclysmic climatic conditions of our planet combined with the virtually complete lack by particle physics of even attempting their solution.

Following the historical results for the structure of the hydrogen atom, the applicability of QM has been extended to all possible conditions of particles with only rare critical analyses. However, this "applicability" has been achieved by introducing free parameter of generally unknown physical origin, using them to achieve the fit of experimental data, and then claim that QM is exact.

The most embarrassing case of asocial particle theology occurs for the Bose-Einstein correlation whose fit of experimental data via QM has requested the two-points correlation function to have four free parameters (called the "chaoticity" parameters) to claim that relativistic quantum mechanics is exactly valid in the field. The problem for the supporter of such a view is that four parameters are prohibited by the quantum axiom of expectation values (because Hermitean operators in this case have only two diagonal elements, thus allowing only two, rather than four parameters). Consequently, rather than supporting QM, the chaoticity parameters are a direct measurement of the deviation of QM from the physical reality of the Bose-Einstein correlation.

A fully similar situation occurs in various other particle events in which experimental fits are reached via *ad hoc* parameters and experimental results are claimed while in reality we merely have a scientific religion.

NEUTRON SYNTHESIS AND DECAY: As originally conceived by Rutherford in 1920 and verified by Chadwick in 1932, the neutron is synthesized in the interior of stars from the hydrogen atoms, namely, from a proton and an electron.

While, on one side, all physicists admit this incontrovertible reality (because stars initiate their lives as being solely composed of hydrogen, thus synthesizing first the neutron), on the other side, very few particle physicists admit that QM is completely unable to represent such a synthesis to such an extent that voids the use of *ad hoc* parameters because:

1) The familiar reaction $p + e \rightarrow n + \nu$ violates the conservation of the energy unless the proton and the electron have a kinetic energy of at least 0.78 MeV (in which case there is no energy left for the neutrino). In fact, the neutron rest energy (939.56 MeV) is 0.78 MeV bigger than the sum of the rest energies of the proton and the electron (938.78 MeV).

2) Recall that all QM bound states (such those for nuclei, atoms and molecules) have a "negative" binding energy. The synthesis of the neutron requires instead a "positive" binding-like energy. Few physicists know that Schroedinger's equation becomes physically inconsistent for the latter systems, as the reader is encouraged to verify by trying to solve any quantum bound state in which the conventional negative binding energy is turned into a positive value. When this inconsistency is attempted to bypass by assuming that the proton and the electron have a relative energy of at least 0.78 MeV, the synthesis is prohibited because at that value the p-e cross section is extremely small.

3) Assuming that the above basic problems can be solved along preferred orthodox lines, QM cannot provide a representation of the meanlife, charge radius, and anomalous magnetic moment of the neutron.

Rather than admitting the need of a covering of QM capable of a quantitative representation of one of the most fundamental events in the universe, a widespread posture in support of the quantum theology is that of ignoring the synthesis altogether. In the scientific reality, QM is inapplicable for the synthesis not only of the neutron, but also of all hadrons at large.

The denial of the inapplicability of QM for the neutron synthesis can cause a damage to society of potentially historical proportions because the neutron is the biggest and most inextinguishable reservoir of clean energy available to mankind since it decays spontaneously (when isolated) into a very energetic and easily trapped electron plus the innocuous neutrino (assuming it exists). A serious scientific resolution of the synthesis of the neutron is expected to lead to means for its stimulated decay in a selected class of light natural stable isotopes into equally light, natural and stable isotopes with lower mass, thus resulting in a much needed clean energy due to the lack of harmful radiations as well as the absence of radioactive waste.

Besides, the achievement of a serious knowledge on the possible laboratory synthesis and stimulated decay of the neutron could have far reaching implications for society, such as permitting conceivable means to stimulate the decay of radioactive nuclear waste, thus rendering environmentally acceptable nuclear power plants as currently available. How can any physicist in the field oppose or otherwise ignore efforts at surpassing QM via a suitable covering theory for the study of environmentally acceptable energies and still expect respect?

The author hopes to be remembered for his irreconcilable disagreement with academic colleagues and laboratory directors on the fact that QM and SR "cannot" be exactly valid for the synthesis and,

therefore, the structure of hadrons (thus demanding specific experiments) for numerous reasons, such as: the impossibility of the exact validity of local-differential theories within hyperdense media requiring nonlocal-integral effects; the inability to fit experimental data from first principles as done for the structure of the hydrogen atom; the evidence that hadrons have no nuclei, thus prohibiting the exact validity of fundamental spacetime symmetries such as the Galileo and the Poincare' symmetries; and other reasons well known in the technical literature.

One of several resolatory experiments the author has recommended over decades to SLAC, FERMILAB, CERN and other particle laboratories is the measure of the behavior of the meanlife of unstable particles with energy, which behavior is expected to deviate from Einsteinian predictions in view of internal nonlocal and non-Hamiltonian effects. Regrettably, this and other resolatory tests have been ignored in favor of experiments known to be aligned with pre-existing theories following the use of *ad hoc* parameters, thus perpetrating the current status of "theological speculations," rather the conduction of research that will resist the test of time.

INSUFFICIENCIES OF THE STANDARD MODEL FOR QUARK CONJECTURES

Following the above indicated conception of the neutron by Rutherford, and its verification by Chadwick, Heisenberg introduced the SU(2) isospin symmetry for a geometrical unified treatment of protons and neutrons, which symmetries was subsequently extended to SU(3), to reach the current formulation of the standard model.

As a result of historical achievement, we believe that the standard model has indeed achieved the final Mendeleev-type classification of particles into families. In fact, all fascinating predictions of new particles, subsequently confirmed by clear experiments, can be all reduced to the primitive classification capabilities of the theory.

However, the hypothesis that quarks are physical particles in our spacetime is a pure Barton's "theology" because it has remained afflicted by a plethora of fundamental unresolved (as well as generally unspoken) insufficiencies, such as:

1) According to the standard model, at the time of the synthesis of the neutron the proton and the electron literally "disappear" from the universe to be replaced by hypothetical quarks as neutron constituents. Moreover, at the time of the neutron spontaneous decay, the proton and the electron literally "reappear" again. Both these views are repugnant to scientific reason, because the proton and the electron are the only stable massive particles clearly established so far and, as such, they simply cannot "disappear" and then "reappear" because so desired by quark supporters. The only plausible hypothesis for the neutron synthesis $p + e \rightarrow n + \nu$ is that the proton and the electron are actual physical constituents of the neutron as originally conjectured by Rutherford, although the latter view requires the adaptation of the theory to physical reality, rather than the opposite attitude implemented by quark "theologies".

2) When interpreted as physical particles in our spacetime, quarks cannot experience any gravity. As clearly stated by Albert Einstein in his limpid writings, gravity can only be defined in our spacetime, while quarks can only be defined in the mathematical, internal, complex valued unitary space with no possible connection to our spacetime (because prohibited by the O'Rafearthaigh's theorem). Consequently, physicists who support the hypothesis that quarks are the physical constituents of protons and neutrons, thus of all nuclei, should see their body levitate due to the absence of gravity.

3) When, again, interpreted as physical particles in our spacetime, quarks cannot have any inertia. In fact, inertia can only be rigorously admitted for the eigenvalues of the second order Casimir invariant of the Poincare' symmetry, while quarks and their masses cannot be defined with such a

basic spacetime symmetry, as expected to be known by experts to qualify as such. Consequently, the idea that quarks have physical masses is pure "theology" deprived of true scientific content. In reality, "quark masses" are arbitrary parameters used to fit things.

4) Even assuming that, with unknown scientific manipulations, the above inconsistencies are resolved, it is known that quark theories have failed to achieve a representation of all characteristics of hadrons, with catastrophic insufficiencies in the representation of spins, magnetic moments, mean lives, charge radii and other basic features of hadrons. The sole need to confine quarks due to the lack of their detection should be sufficient for their dismissal as physical particles since a serious confinement can only be achieved via the by-passing of Heisenberg's uncertainly principle that always admit a finite probability for quarks to be free. Hence, the very conception of quarks is in conflict with QM axioms (the sole possibility to have an identically null probability for quarks to tunnel outside is by rendering incoherent the interior and exterior Hilbert spaces, namely, by assuming a generalized mechanics in the interior of particles).

5) It is also known by experts that the application of quark conjectures to the structure of nuclei has multiplied the controversies, while resolving none of them. As an example, the assumption that quarks are the constituents of protons and neutrons in nuclei has failed to achieve a representation of the main characteristics of the simplest possible nucleus, the deuteron. In fact, quark conjectures multiply the limitations of QM to represent the spin 1 of the deuteron (since there are problems even in representing the spin of the proton and of the neutron), of the anomalous magnetic moment of the deuteron (because the "theological" quark orbits are too small to allow the needed polarizations), or the stability of the neutron when a deuteron constituent, they are unable to represent the charge radius of the deuteron, etc.

The author's view is that quarks are indeed necessary for the standard model, and he uses them routinely for calculations in the field, trivially, because quarks are the regular representation of the SU(3) symmetry. Yet, after decades of studies in the field, the author has been unable to identify truly serious reasons for quarks to be physical particles in our spacetime. At any rate, the continuation of claims that quarks are physical particles without a rigorous proof that they have gravity goes beyond the level of Barton's "theology" since it raises serious problems of scientific ethics and accountability.

On historical grounds, the classification of nuclei, atoms and molecules required two different models, one for the classification and a separate one for the structure of the individual elements of a given family. Quark theories depart from this historical teaching because of their conception of representing with one single theory both the classification and the structure of particles.

The view advocated is that, quite likely, history will repeat itself. The transition from the Mendeleev classification of atoms to the atomic structure required a basically new theory, QM. Similarly, the transition from the Mendeleev-type classification of particles to the structure of individual particles will require a broadening of the basic theory, this time a generalization of QM due to the dramatic differences of the dynamics of particles moving in vacuum, as in the atomic structure, to the dynamics of particles moving within hyperdense media as in the hadronic structure.

In the final analysis, the "theology" that quarks are physical particles in our spacetime is, by far, the most dangerous for mankind because it prevents even the consideration of the new clean energy contained in the neutron, trivially, because according to the standard model the neutron constituents cannot be released free. By comparison, if the proton and the electron are the physical constituents of the neutron according to Rutherford's conception, the electron can be excited by stimulating the neutron's decay with the understanding that QM must be necessarily abandoned in favor of a covering theory developed for the synthesis, as stressed earlier.

The reader should not forget that nuclear, atomic and molecular structures have made momentous contributions to mankind precisely because their constituents can be produced free. By comparison, quark conjectures have made no practical contributions whatever and none is even remotely conceivable precisely because of the "theology" that quarks are permanently confined.

In short, the insufficiencies of the quark hypothesis are a mere manifestation of Richter's "theological speculations," not on marginal aspects, but on the truly fundamental aspect, the impossibility for QM and SR to be exactly valid for the synthesis, structure, scattering and decays of particles.

INSUFFICIENCIES OF THE STANDARD MODEL FOR NEUTRINO CONJECTURES

Following Pauli's indication that the synthesis of the neutron from a proton and an electron according to QM misses spin 1/2, and Fermi's hypothesis of the neutrino (meaning "little neutron" in Italian), neutrino physics is today part of the standard model.

Despite clearly historical studies, neutrino physics is indeed a clear example of Barton's "theological speculations" because it has remained afflicted by fundamental, unresolved (as well unreassuringly unspoken), theoretical and experimental problems, such as:

1) Neutrino physics is based on an excessive number of individually unverifiable assumptions. In fact, the original hypothesis of one massless neutrino, was replaced by the sequential hypotheses that: there exist three different neutrinos and their antiparticles; neutrinos have masses; neutrino masses are different; neutrinos "oscillate"; with additional hypotheses expected due to the known insufficiencies of all preceding ones.

2) According to the standard model, said various neutrinos can traverse very large hyperdense media (such as entire stars) without any collision while being massive particles carrying energy in our spacetime. This view is outside scientific reason.

3) As indicated earlier, the synthesis of the neutron $p + e \rightarrow n + \nu$ misses 0.78 MeV. In the event the proton and the neutron have the relative energy of 0.78 MeV, there is no energy left for the neutrino and, in any case, the synthesis is not possible due to the virtually null cross section of protons and electrons at said energy.

4) Calculations on the "bell shaped" form of the energy of the electron in nuclear beta decays show that no energy appears to be left for the neutrino, provided that nuclei are represented in their actual extended size. In fact, the Coulomb interaction between an extended nucleus and the emitted electron varies with the direction of the beta emission, with maximal (minimal) value for radial (tangential) emissions, the 'missing energy' being apparently absorbed by the nucleus.

5) Neutrino experiments are perhaps more controversial than theoretical studies because: the number of events used as "experimental evidence" for the existence of neutrinos is excessively small over an extremely large number of events, thus preventing acceptance by the physics community at large; experimental data are elaborated with a theory crucially dependent on the existence of the neutrinos, in which case the "experimental results" are expected to depend on the theoretical assumptions; the theory contains an excessive number of parameters (such as the different neutrinos masses and others) essentially capable to achieve any desired fit; some of the recent "neutrino detectors" contain radioactive isotopes that could themselves trigger the very few selected events; and other reasons.

The author fails to understand an argument often voiced as "evidence" for the existence of the neutrino, the experimental evidence on the conservation of the leptonic number. In fact, such an argument *de facto* implies that the violation of parity in weak interactions is "evidence" for the

existence of another yet unknown particle.

In reality, the lack of existence of the neutrino as physical particle in our spacetime can stimulate momentous advances, such as conceivable new communications propagating via longitudinal impulses through the ether at a speed predicted to be a multiple of that of the conventional transversal electromagnetic waves, thus providing hopes that mankind may one day initiate interstellar communications for which light signals can only be compared to smoke signals during the early human civilization. Yet, the price to pay for these momentous advances is the abandonment of the religious "theology" of the universal validity of SR for all conditions existing in the universe.

We believe that all the above insufficiencies are just a manifestation of the truly basic one, namely, Richter's "theological speculations" not referred to tangential aspects. but to the inapplicability of QM and SR for conditions outside those of their original conception, thus being inapplicable as exact disciplines, rather than violated.

INCONSISTENCIES OF GENERAL RELATIVITY AND ASTROPHYSICS

While QM and SR have their own arena of exact validity outside which they remain valid as an approximation of reality, General Relativity (GR) is known to be, by far, the most controversial scientific "theology" in history because of an excessive number of structural inconsistencies in its conception, such as:

1) We have all been teaching at the graduate school of physics that analytic theories without a Hamiltonian cannot represent any dynamics, trivially, because of the impossibility of formulating any meaningful time evolution. GR has indeed an identically null Hamiltonian and, consequently, any attempt at dynamical treatments, such as the evolution of planets, is a pure "theology" deprived of serious or otherwise credible scientific content.

2) Assuming that the above basic inconsistency can be somewhat bypassed, GR is noncanonical at the classical level and nonunitary at the operator level. it is today known that these theories verify the "theorems of catastrophic inconsistencies." In fact. GR cannot leave invariant in time the basic unit of its geometry, thus being unable to preserve in time the numerical values of the units of measurements, with consequential catastrophic collapse of the mathematical structure (due to the loss over time of the base field), as well as of the physical structure (inability to admit the same numerical predictions under the same conditions at different times, violation of causality, and other inconsistencies inherent in all noncanonical or nonunitary theories).

3) Einstein's field equations $G_{\mu\nu} = 0$ are irreconcilably incompatible with quantum electrodynamics because they attempt the reduction of gravity to pure curvature without source while quantum electrodynamics requires the presence of a first-order source tensor even for neutral systems such as the pi-zero meson. In any case, Einstein's attempt to reduce gravity to pure curvature without source is disproved by the forgotten fifth identity of the Riemannian geometry, the Freud Identity (that requires the presence of two source tensors).

4) GR is not compatible with SR on numerous counts, such as the presence in GR of a well defined Newtonian limit in PPN approximation but the absence of any meaningful Minkowskian limit; the impossibility for gravitational conservation laws to admit a relativistic counterpart due to the fact that the latter are the generators of a symmetry, the Poincare' symmetry, while GR has no symmetry but only covariance.

5) It is today known that the bending of the light near astrophysical bodies, that lead to a world wide support of GR as well as to one of Einstein's Nobel prizes, in reality is due to the Newtonian attraction of light, and definitely not to curvature. Also, curvature is irreconcilably incompatible with a main gravitational event, the free fall of bodies along a radial line for which the notion of

curvature has no sense. Additionally, the notion of curvature does not allow a unique representation of experimental data since there are several possible PPN expansions and, consequently, several possible numerically different gravitational realities. Should the author keep going?

There is no doubt that the religious fervor in support of a catastrophically inconsistent theory such as GR, while systematically ignoring incontrovertible inconsistencies, has led to the biggest scientific "theology" in history, including large collateral scientific damage, such as: wasting a river of ink and public money in attempting a grand unification inclusive of gravitation that is simply beyond rational science due to dramatic structural differences; an additional river of ink and public funds to attempt a reconciliation of QM and GR that have also been theological inquiries since a first year graduate student in physics can prove that, assuming GR admits a consistent operator formulation, quantities that are observable (Hermitean) at the initial time are no longer so at a later time for a nonunitary theory (Lopez's lemma).

The implications for astrophysics of the widespread extension of SR to conditions it is clearly inapplicable plus the use of a GR afflicted by so vast inconsistencies can only be dubbed as dramatic.

To illustrate the gravity of the condition, recall that the statement "universal constancy of the speed of light" is one of the most corrupt statement in science when not completed with the words "in vacuum," since the verification has solely occurred in vacuum and it is today well established that the speed of light is smaller than that in vacuum for transparent media of low density while it is generally bigger than that in vacuum for transparent media of high density.

. At any rate, the extension of the speed of light as the maximal causal speed for the hyperdense media in the interior of stars and quasars is beyond scientific reason since light does not even propagate within these media. But then, the use of the speed of light "in vacuum" to compute the energy equivalence of a "hyperdense" star $E = mc^2$, the conjecture of dark matter and all that can only be dubbed as "wild theologies" since recently calculated maximal causal speeds within the hyperdense interior of stars and quasars are so vastly bigger than that in vacuum to void any need for dark matter.

Similarly, the most plausible explanation not only for the expansion of the universe, but also for its acceleration, is that the universe is made up of matter and antimatter galaxies under mutual, continuous gravitational repulsion.

This old cosmological conception has been systematically discredited for about one century on religious grounds that both SR and GR do not admit antigravity. The point where serious science turns into a "wild theology" mandating senatorial investigations when perpetrated under governmental support is that both the SR and GR cannot even represent antimatter, as recalled earlier.

The "theological" difficulty for new vistas in astrophysics is that they mandate the abandonment of SR and GR for suitable covering theories more plausible for the interior of matter stars and different covering theories for antimatter stars.

THE ONGOING SCIENTIFIC OBSCURANTISM

In the 1970s, the author received research support from the United States Air Force Office of Scientific Research (USAFOSR). One day, in the mid 1970s, the author received a phone call from an officer of the USAFOSR informing him that the U. S. Military had decided to terminate support for academic research. In fact, soon thereafter funding of academic research was passed to ERDA that subsequently became the U. S. Department of Energy (DOE).

At that time, the author was rather naive and asked: "But how can the American Military remain strong if funding of academic research is ended?" at which the USAFOSR officer promptly

replied "Because we cannot allow the security of the United States be hostage to pet theories preferred by professors at leading academic institutions."

Following the passage of three decades,, nobody can credibly deny that the U. S. Military has made scientific and technological advances beyond our imagination, while academic research has solely seen "theological speculations" such as neutrino or quark conjectures and the like, without any truly basic and/or fundamental advance.

The reason for the transparent disparity is precisely that stated by the USAFOSR officer, namely, that military research has advanced because without any religious attachment to preferred "pet theories," while no possible basic advance for academic research could be predicted since the mid 1970s, and none actually occurred, because of the systematic restriction of all research funding and academic positions to be "hostage" of preferred "pet theories."

Few academicians know that a number of U. S. corporations are now following the example of the U. S. Military, namely, they avoid disclosing to academia the most advanced part of their R&D. In fact, the author has conducted advanced corporate research under contractual obligations not to disclose it to academia because of expected abuses of academic authority in the protection of preferred "pet theories" causing the termination of corporate research funding.

All these and other unreassuring occurrences are a manifestation of the insufficiency of Burton Richter's denunciation of the theological nature of contemporary research because, even though deserving full respect and appreciation by any responsible scientist or citizen, such a denunciation did not have sufficient depth to identify the origin of the problem in the religious dominance of preferred "pet theories" now merely belonging to the past century.

After some 50 years of research, the author feels obliged to denounce the ongoing existence of a scientific obscurantism of such a dimension to dwarf by comparison the scientific obscurantism imposed by the Vatican during Galileo's times.

Even though fully deplorable, the origin of the latter obscurantism can be seen in actual religious issues of the time, while Galileo's ideas eventually proved to have do damaging effect to the Vatican. By comparison, the origin of the ongoing scientific obscurantism can be seen in very large organized interests in pre-existing theories of such a dimension to render lilliputian the religious interests during Galileo's time.

Above all, the obscurantism imposed by the Vatican had no impact on the people of Galileo's times since it dealt with religious dogmas. By comparison, the ongoing scientific obscurantism is having a potentially devastating impact on our planet because, as shown during these comments, the solution of the increasingly cataclysmic climactic changes is known not to be admitted by quantum mechanics and special relativity but to require their surpassing via suitable covering theories.

The only possibility of avoiding a condemnation by posterity of historical proportion is that the U. S., British, German, French and other physical societies implement a serious scientific democracy for qualified inquiries in which research and publications along "pet theories" do indeed continue but, jointly, physical societies halt their current practices of dismissing basic advances via attempted discreditations and abuse of authority, rather than credible technical arguments. As a matter of fact, to really serve society in a moment of need, physical societies should have the opposite posture, that of providing priority to much needed basic advances and relegate studies along preferred "pet theories" for what they are, "theological speculations" outside contemporary real science.

In short, it is time for the physics community to come to its senses and admit that "basic research" primarily refers to the laborious effort of trial and error, not toward tangential issues of marginal relevance on pre-existing doctrines, but toward basic advanced beyond pre-existing doctrine. After all, the rather widespread "theological" belief that quantum mechanics, special and

general relativity and the standard model are of final character for all events in the universe is strictly amoral, ascientific and asocial.

REFERENCES

The literature underlying the studies touched in the above comments is so vast to prevent discriminatory partial lists. Serious scholar may consult the 90 pages long General Bibliography available at www.i-b-r.org/Hadronic-Mechanics.htm The same web site presents conceivable covering theories for the solution of the insufficiencies and/or inconsistencies herein considered. Additional specific studies can be located in the www.arxiv.org by searching papers under the author's name, and inspecting the quoted references.

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